

First ISCCP Regional
Experiment (FIRE)
Atlantic Stratocumulus
Transition Experiment
(ASTEX) University of
Washington (UW)
Langley DAAC Data Set
Document



Summary:

The First ISCCP Regional Experiments have been designed to improve data products and cloud/radiation parameterizations used in general circulation models (GCMs). Specifically, the goals of FIRE are (1) to improve the basic understanding of the interaction of physical processes in determining life cycles of cirrus and marine stratocumulus systems and the radiative properties of these clouds during their life cycles and (2) to investigate the interrelationships between the ISCCP data, GCM parameterizations, and higher space and time resolution cloud data.

To-date, four intensive field-observation periods were planned and executed: a cirrus IFO (October 13 - November 2, 1986); a marine stratocumulus IFO off the southwestern coast of California (June 29 - July 20, 1987); a second cirrus IFO in southeastern Kansas (November 13 - December 7, 1991); and a second marine stratocumulus IFO in the eastern North Atlantic Ocean (June 1 - June 28, 1992). Each mission combined coordinated satellite, airborne, and surface observations with modeling studies to investigate the cloud properties and physical processes of the cloud systems.

All data sets discussed in this document were produced by University of Washington (UW). These data sets are:

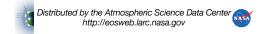
- FIRE_AX_UW_C131A
- FIRE_AX_UW_DSCRT
- FIRE_AX_UW_GERB_10HZ
- FIRE_AX_UW_GERB_1HZ

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1. Data Set Overview:

Data Set Identification:



FIRE_AX_UW_C131A:

FIRE_AX_UW_DSCRT:

FIRE_AX_UW_GERB_10HZ:

FIRE AX UW GERB 1HZ:

First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Aircraft Data (FIRE_AX_UW_C131A)

First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Discrete Data (FIRE_AX_UW_DSCRT)

First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Cloud 10 Hertz (FIRE_AX_UW_GERB_10HZ)

First ISCCP Regional Experiment (FIRE) Atlantic Stratocumulus Transition Experiment (ASTEX) University of Washington C-131A Cloud 1 Hertz (FIRE_AX_UW_GERB_1HZ)

Data Set Introduction:

FIRE_AX_UW_C131A

The development of parameterizations requires an understanding of the processes that generate, maintain, and dissipate boundary layer clouds. This development is currently impeded by lack of understanding of the transition from stratocumulus clouds to trade cumulus clouds and the factors that control cloud type and amount in the boundary layer. The Atlantic Stratocumulus Transition EXperiment (ASTEX) was designed to address key issues related to stratocumulus to trade cumulus transition and mode selection. ASTEX involved intensive measurements from several platforms operating from 1-28 June 1992 in the area of the Azores and Madeira Islands. The purpose was to study how the transition and mode selection are effected by 1) cloud-top entrainment instability, 2) diurnal decoupling and clearing due to solar absorption, 3) patchy drizzle and a transition to horizontally inhomogeneous clouds through decoupling, 4) mesoscale variability in cloud thickness and associated mesoscale circulations, and 5) episodic strong subsidence lowering the inversion below the LCL. Detailed descriptions of the scientific goals of ASTEX are in the FIRE Phase II: Research plan (1989) and in the ASTEX Operations Plan (1992).

The University of Washington Convair data are best considered raw at this point and should be validated by comparing with data collected from other platforms where possible if high accuracy is desired.

Of the three measures of liquid water content available from the Convair, the Johnson-Williams (JW) hot-wire probe is considered the most readily usable, although there is a significant drift in the output that should be accounted for. The Forward Scattering Spectrometer Probe (FSSP) measured the liquid water content using optical scattering principles.

FIRE_AX_UW_DSCRT

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This ASCII formatted data set includes data collected aboard the University of Washington's Corsair 131A airplane. Several different probes were used to gather data on the liquid water content of clouds, the droplet radius/diameter, and condensation nuclei measurements. All sulfur parameter measurements were made using filter methods.

FIRE_AX_UW_GERB_10HZ

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This ASCII formatted data set includes data collected aboard the University of Washington's Corsair 131A airplane. The cloud microphysics probe (PVM-100A) was used to gather data on cloud liquid water content, particle surface area, and effective droplet radius. Please refer to the reference authored by H. Gerber to obtain information on how the raw data were reduced to produce this data set.

FIRE_AX_UW_GERB_1HZ

The development of parameterizations requires an understanding of the processes that generate, maintain, and dissipate boundary layer clouds. This development is currently impeded by lack of understanding of the transition from stratocumulus clouds to trade cumulus clouds and the factors that control cloud type and amount in the boundary layer. The Atlantic Stratocumulus Transition EXperiment (ASTEX) was designed to address key issues related to stratocumulus to trade cumulus transition and mode selection. ASTEX involved intensive measurements from several platforms operating from 1-28 June 1992 in the area of the Azores and Madeira Islands. The purpose was to study how the transition and mode selection are effected by 1) cloud-top entrainment instability, 2) diurnal decoupling and clearing due to solar absorption, 3) patchy drizzle and a transition to horizontally inhomogeneous clouds through decoupling, 4) mesoscale variability in cloud thickness and associated mesoscale circulations, and 5) episodic strong subsidence lowering the inversion below the LCL. Detailed descriptions of the scientific goals of ASTEX are in the FIRE Phase II: Research plan (1989) and in the ASTEX Operations Plan (1992).

This ASCII formatted data set includes data collected aboard the University of Washington's Corsair 131A airplane. The cloud microphysics probe (PVM-100A) was used to gather data on cloud liquid water content, particle surface area, and effective droplet radius. Please refer to the reference authored by H. Gerber to obtain information on how the raw data were reduced to produce this data set.

Objective/Purpose:
Summary of Parameters:
Discussion:
Related Data Sets:
2. Investigator(s):
Investigator(s) Name and Title:
Title of Investigation:
First ISCCP Regional Experiment (FIRE)

for FIRE_AX_UW_C131A and FIRE_AX_UW_DSCRT:

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Phone: (703) 742-9844 FAX: (703) 742-3374

E-mail: gerber@access.digex.net

3. Theory of Measurements:

...

4. Equipment:

Sensor/Instrument Description:

Collection Environment:

•••

Source/Platform:

FIRE_AX_UW_C131A UW C131
FIRE_AX_UW_DSCRT UW C131
FIRE_AX_UW_GERB_10H UW C131
Z
FIRE_AX_UW_GERB_1HZ UW C131

Source/Platform Mission Objectives:

...

Key Variables:

FIRE_AX_UW_C131A Condensation Nuclei

Dew/Front Point Temperature

Droplet Concentration

Humidity Irradiance

Liquid Water Content

Ozone Pressure

Surface Temperature

Temperature Turbulence

FIRE_AX_UW_DSCRT Carbon Dioxide

Carbon Monoxide
Condensation Nuclei
Dimethylsulfide
Droplet Concentration
Effective Droplet Diameter
Effective Droplet Radius
Liquid Water Content

Ozone

Particle Diameter

Particle Number Concentration

Potential Temperature

Sulfate Sulfur Dioxide Temperature

Liquid Water Content Particle Surface Area

FIRE_AX_UW_GERB_1HZ Effective Droplet Radius

Liquid Water Content Particle Surface Area

Sensor/Instrument Measurement Geon	netry:
Manufacturer of Sensor/Instrument:	
Sensor/Instrument:	
FIRE_AX_UW_C131A	C2H4 CHEMILUMINESCEN CAPACITIVE SENSOR CHILLED MIRROR CLOUD CHAMBER FSSP HOT-WIRE HYGROMETER PLATINUM RESISTANCE PYRANOMETER RADIOMETER REVERSE FLOW RMS PRESSURE VAR
FIRE_AX_UW_DSCRT	C2H4 CHEMILUMINESCEN CLOUD CHAMBER FILTER/FLUORESCENCE FILTER/IC FSSP GC-FID HOT-WIRE IR CO ANALYZER IR CO2 ANALYZER OPTICAL COUNTER PLATINUM RESISTANCE SPECTROMETER
FIRE_AX_UW_GERB_10HZ	OPTICAL COUNTER
FIRE_AX_UW_GERB_1HZ	OPTICAL COUNTER
Calibration:	
Specifications:	
Tolerance:	
Frequency of Calibration:	
Other Calibration Information:	
5. Data Acquisition Method	s:

6. Observations:

_	
Data	Notes:
11010	140162

...

Field Notes:

...

7. Data Description:

Spatial Characteristics:

Spatial Coverage:

Data Set	Min Lat	Max Lat	Min Lon	Max Lon
FIRE_AX_UW_C 131A	32.34	38.94	-27.21	-21.23
FIRE_AX_UW_D SCRT	32.34	38.04	-26.75	-21.23
FIRE_AX_UW_G ERB_10HZ	32.34	37.33	-26.65	-22.22
FIRE_AX_UW_G ERB_1HZ	32.34	37.33	-26.65	-22.22

Spatial Coverage Map:

There are no maps available for these data sets.

Spatial Resolution:

Projection:

•••

Grid Description:

...

Temporal Characteristics:

Temporal Coverage:

Data Set	Begin Date	End Date	
FIRE AX UW C131A	06-02-1992	06-27-1992	
FIRE AX UW DSCRT		06-27-1992	
FIRE_AX_UW_GERB_1		06-26-1992	
OHZ	00.00.4000	00.00.4000	
FIRE_AX_UW_GERB_1 HZ	06-02-1992	06-26-1992	

Temporal Coverage Map:

There are no maps available for these data sets.

Temporal Resolution:

Data Characteristics:

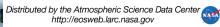
Parameter/Variable:

FIRE_AX_UW_C131A

Variable		Units
time	hhmmss (Z)	
lat (gps)	deg N	
lon (gps)	deg E	
lat (omega)	deg N	
lon (omega)	deg E	
heading (omega)	deg	
true airspeed	m/sec	
pressure altitude	km	
pressure	mb	
temperature (reverse-flow)	С	
temperature (Rosemount)	С	
dewpoint (EG&G)	С	
dewpoint (Ophir)	С	
absolute humidity (Ophir)	g/m^3	
turbulence	cm^(2/3)/sec	
condensation nuclei	#/cm^3	
droplet concentration (FSSP)	#/cm^3	
liquid water (FSSP)	g/m^3	
liquid water (Johnson-Williams probe)	g/m^3	
liquid water (King probe)	g/m^3	
sst	С	
visible radiation (upward)	W/m^2	
visible radiation (downward)	W/m^2	
uv radiation	W/m^2	
ozone	ppb	

FIRE_AX_UW_DSCRT

- 1. time: the time of sample collection; units are hh:mm LST.
- 2. altitude: pressure-altitude of aircraft; units are kilometers.
- 3. temperature: environmental temperature; units are degrees C.
- 4. temperature (humidity-corrected): units are degrees C.
- 5. potential temperature: units are degrees C.
- 6. moist static energy: the sum of the sample's enthalpy, gravitational potential energy and latent heat content; analogous to equivalent potential temperature; units are joules per gram of air.
- 7. liquid water content: measured with the Johnson-Williams probe; units are grams of water per cubic meter of air.
- 8. droplet concentration: atmospheric concentration of water droplets measured with the Forward Scattering Spectrometer Probe; units are number of droplets per cubic centimeter of air.
- 9. liquid water content: measured with the Forward Scattering Spectrometer Probe; units are grams per cubic meter.
- 10. effective droplet radius: measured with the Forward Scattering Spectrometer Probe; units are microns. 11. liquid water content: measured with the Gerber probe; units are grams per cubic meter.
- 12. effective droplet diameter: measured with the Gerber probe; units are microns.
- 13. carbon dioxide concentration: units are ppm.
- 14. carbon monoxide concentration: detection limit is 0.25 ppm.
- 15, ozone concentration; units are ppb
- 16. sulfur dioxide concentration: units are ppt; detection limit is 5 ppt.
- 17. dimethylsulfide concentration: units are ppt; detection limit is 2 ppt.
- 18. particulate sulfate concentration: units are micrograms of sulfate per cubic meter of air; detection limit is 0.005 micrograms per cubic meter.
- 19. condensation nuclei (particle) concentration: units are number of particles per cubic centimeter of air; particle size limit for detection is ~0.005 microns.
- 20. particle diameter: for particle spectra plots; measured with Differential Mobility Particle Spectrometer; units are microns.



21. dn/dlogd: particle number concentration per size increment for particle spectra plots; measured with Differential Mobility Particle Spectrometer; units are number per cubic centimeter. ******(Please refer to the readme file which accompanies this data set. There is important information pertaining to the collected validity of the data.)*****

FIRE_AX_UW_GERB_10HZ

Please refer to the Sample Data Record below for variables and units contained within these data sets.

FIRE_AX_UW_GERB_1HZ

Please refer to the Sample Data Record below for variables and units contained within these data sets.

Variable Description/Definition:

...

Unit of Measurement:

•••

Data Source:

•••

Data Range:

...

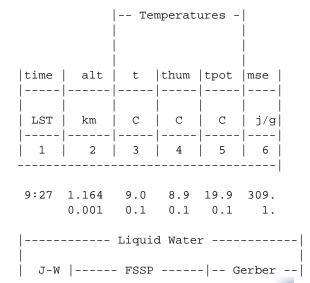
Sample Data Record:

FIRE_AX_UW_C131A

flight 1	557 06/	02/92 25	5							
timeh	latgps	longps	3	latom	3	lonor	ng	thd	go t	as
hhmmss	deg	deg		deg		deg		m/s	3	km
085900	36.888	-25.19	9	36.91		-25.2	20	136	5. 8	0.9
palt	pstat	tstatr	ts	tat	dр		dp_c)		
deg	m/s	deg C	deg	g C	deg	g C	deg	С		
0.875	908.	5.2	5	. 5	4.8	3	6.0			
rhovo	turb			cnc1			fsp	rt	lwfsp)
gm/m^3	cm^(2/3)/s #/cm^	`3	#/cm^	3 gn	n/m^3	gm,	/m^3	gm/m^	.3
7.28		0.8		1	552.	•	148		0.062	:
7 747 - 747	lwka	irtemr)	pyrup		pyrdi	า	1137		03

± ••) ••	± w119	TT CCIIIP	PILAP	PILAII	a v		0.5
deg C	W/m^2			W/m^2	w/m^2	ppb	
0.107	****	13.66	246.	18.	11.		29.2

FIRE_AX_UW_DSCRT



	lwc	 drpc	lwc	efra	 lwc	efdi	
	m^3	#/ cm^3	gm/ m^3	 um	 gm/ m^3	 um	
	7			:			
_	0.000	0 0	0.000	ND	0.025	ND	_
		(Gases -		 		-

	(Gases -				Part	cicles -	
				Sulfu	 r 		DMI	
 co2	co	03	 so2	dms	 slft 	cn	d d	dndld
						#/		
ppm	ppm	ppb 	ppt 	ppt 	m^3	cm^3	um	cm^3
13	14	 15 	 16 	 17 	 18 	19	20	21

371.6 BDL 40.3 ND ND ND 532 ND ND 0.6 0.5 8

FIRE_AX_UW_GERB_10HZ

June 15 Interval FLT 1563 No. 21 U.W. Time frl61100 tol65000 PSA time LWC r(eff) $(g/m^3) (cm^2/m^3)$ (S) 0.000 -0.008 -38.500 -0.008 -38.497 0.000 0.102 0.000 -0.008 -38.494 -0.008 -15.391 0.203 0.000 0.000 0.305 -0.008 -15.388 0.406 0.000 -0.008 -15.385 0.508 0.000 -0.008 -38.482 0.609 0.000 -0.008 -38.479 0.711 0.000 -0.008 -38.476 0.813 0.000 -0.008 -15.373 0.914 0.000 -0.008 -15.373 -0.008 -38.470 -0.008 -15.367 -0.008 -15.364 -0.008 -15.361 1.016 0.000 1.117 0.000 1.219 0.000 1.320 0.000 -0.013 -15.358 -0.008 -15.355 -0.008 -15.352 -0.008 -15.349 1.422 0.000 1.524 0.000 1.625 0.000 1.727 0.000 -0.008 -38.446 -0.008 -15.343 1.828 0.000 1.930 0.000 2.031 -0.008 -38.440 0.000

SAMPLE DATA: "ASTEX21.1HZ"

FLT 1563 June 15 Interval No.21 U.W. Time frl61100 tol65000 --

time LWC PSA r(eff)
(s) (g/m^3) (cm^2/m^3) (um)
0.000 0.000 0.000 0.000

WITH WITH WITH

DRIZZLE DRIZZLE DRIZZLE

LWC PSA r(eff)
(g/m^3) (cm^2/m^3) (um)
0.000 0.000

1.016 -	-0.008 -	29.243	0.000	-0.008	-29.243	0.000
2.031	-0.009	-19.973	0.000	-0.009	-19.973	0.000
3.047	-0.008	-24.564	0.000	-0.008	-24.564	0.000
4.063	0.009	26.286	0.000	0.009	26.286	0.000
5.078	0.003	10.147	0.000	0.003	10.147	0.000
6.094	0.000	-1.373	0.000	0.000	-1.373	0.000
7.008	0.000	-2.886	0.000	0.000	-2.886	0.000
8.024	-0.001	0.224	0.000	-0.001	0.224	0.000
9.039	-0.002	0.255	0.000	-0.002	0.255	0.000
10.055	0.000	-1.256	0.000	0.000	-1.256	0.000

FIRE_AX_UW_GERB_1HZ

Same as $FIRE_AX_UW_GERB_10HZ$

8. Data Organization:

Data Granularity:

A general description of data granularity as it applies to the IMS appears in the **EOSDIS Glossary**.

Data Format:

FIRE_AX_UW_C131A ASCII FIRE_AX_UW_DSCRT ASCII FIRE_AX_UW_GERB_10H ASCII Z FIRE_AX_UW_GERB_1HZ ASCII

9. Data Manipulations:

Formulae:

Derivation Techniques and Algorithms:

•••

Data Processing Sequence:

Processing Steps:

Processing Changes:

...

Calculations:

Special Corrections/Adjustments:

•••

Calculated Variables:

...

Graphs and Plots:

•••

10. Errors:	
Sources of Error:	
Quality Assessment:	
Data Validation by Source:	
Confidence Level/Accuracy Judgement:	
Measurement Error for Parameters:	
Additional Quality Assessments:	
Data Verification by Data Center:	
11. Notes:	
Limitations of the Data:	
•	
Known Problems with the Data:	
Jsage Guidance:	
Any Other Relevant Information about the Study:	
•	
2. Application of the Data Set:	
I3. Future Modifications and Plans:	
There are no plans for future modifications of these data sets.	
14. Software:	
Software Description:	
here isn't any read software for these data sets.	

Software Access:

Readme files and other types of files to assist in working with the data will be provided when users order these data sets through the Langley DAAC.

15. Data Access:

Contact Information:

Langley DAAC User and Data Services Office NASA Langley Research Center Mail Stop 157D Hampton, Virginia 23681-2199 USA

Telephone: (757) 864-8656 FAX: (757) 864-8807

E-mail: support-asdc@earthdata.nasa.gov

Data Center Identification:

Langley DAAC User and Data Services Office NASA Langley Research Center Mail Stop 157D Hampton, Virginia 23681-2199 USA

Telephone: (757) 864-8656 FAX: (757) 864-8807

E-mail: support-asdc@earthdata.nasa.gov

Procedures for Obtaining Data:

The Langley DAAC Information Management System (IMS) is an on-line system that features a graphical user interface (GUI) that allows to query the Langley DAAC data set holdings, to view pre-generated browse products, and to order specific data products. Users may also request data by letter, telephone, electronic mail (INTERNET), or personal visit.

The Langley DAAC User and Data Services (UDS) staff provides technical and operational support for users ordering data. The Langley DAAC Handbook is available in a postscript file through the IMS for users who want detailed information about the Langley DAAC holdings. Users may also obtain a copy by contacting:

Langley DAAC User and Data Services Office NASA Langley Research Center Mail Stop 157D Hampton, Virginia 23681-2199 USA

Telephone: (757) 864-8656 FAX: (757) 864-8807

E-mail: support-asdc@earthdata.nasa.gov

URL: http://eosweb.larc.nasa.gov

Data Center Status/Plans:

The Langley DAAC will continue to archive this data. There are no plans to reprocess.

16. Output Products and Availability:

There are no output products available at this time.

17. References:

...

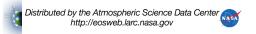
18. Glossary of Terms:

EOSDIS Glossary.

19. List of Acronyms:

NASA - National Aeronautics Space Administration URL - Uniform Resource Locator

EOSDIS Acronyms.



20. Document Information:

Document Revision Date:

October 07, 1996; May 28, 1997; November 24, 1997

Document Review Date:

October 07, 1996

Document ID:

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Citation:

Document Curator:

Langley DAAC User and Data Services Office

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